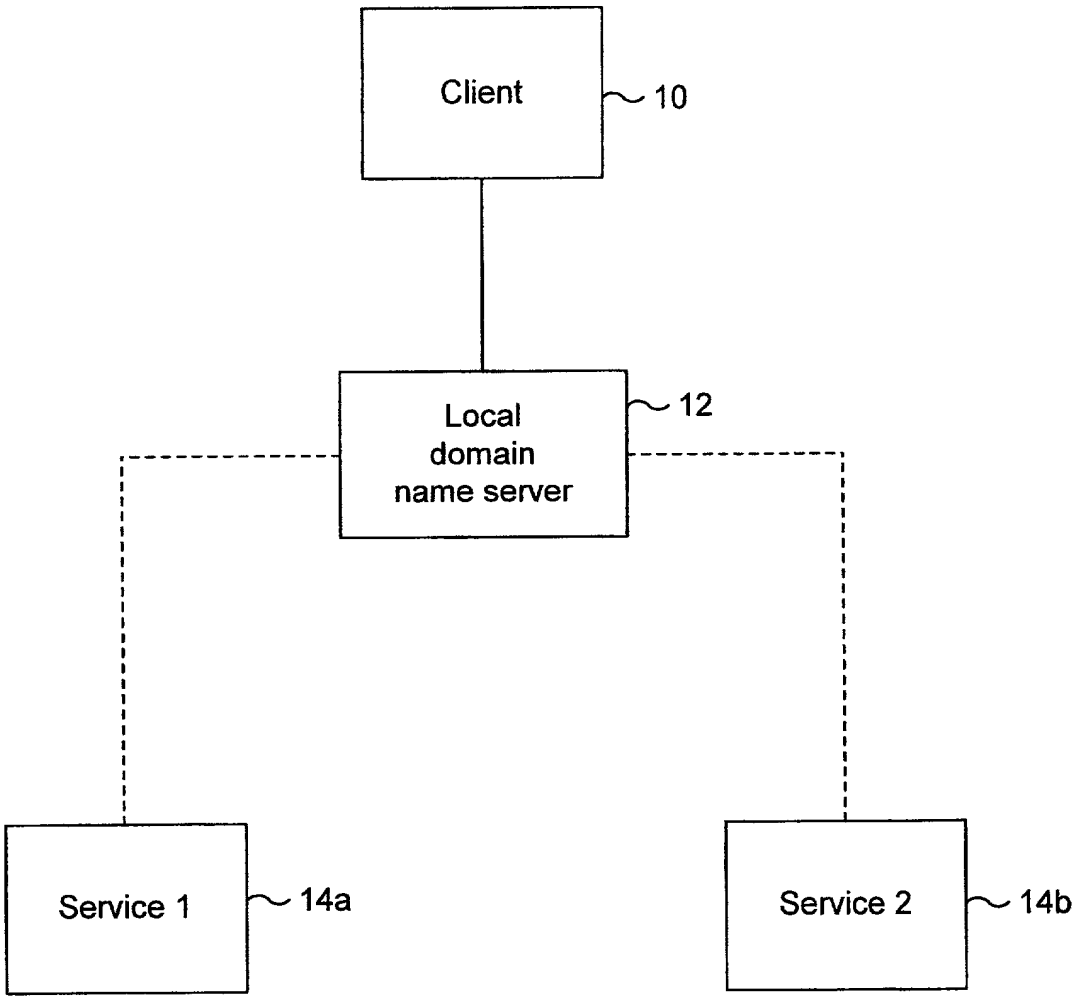
Client
10
Local
domain
name server
12
Service 1
14a
Service 2
14b

Figure 1

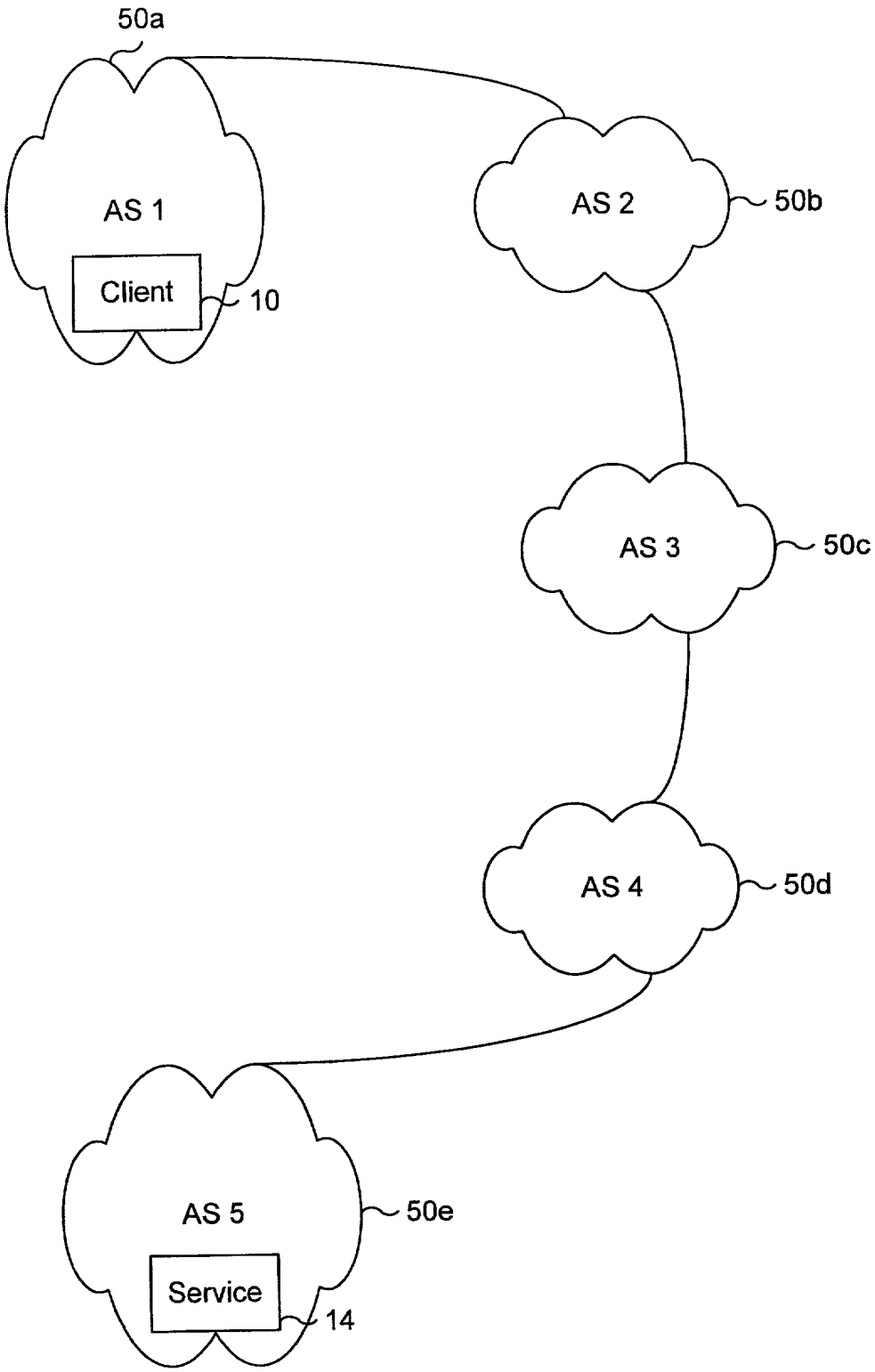

Figure 2

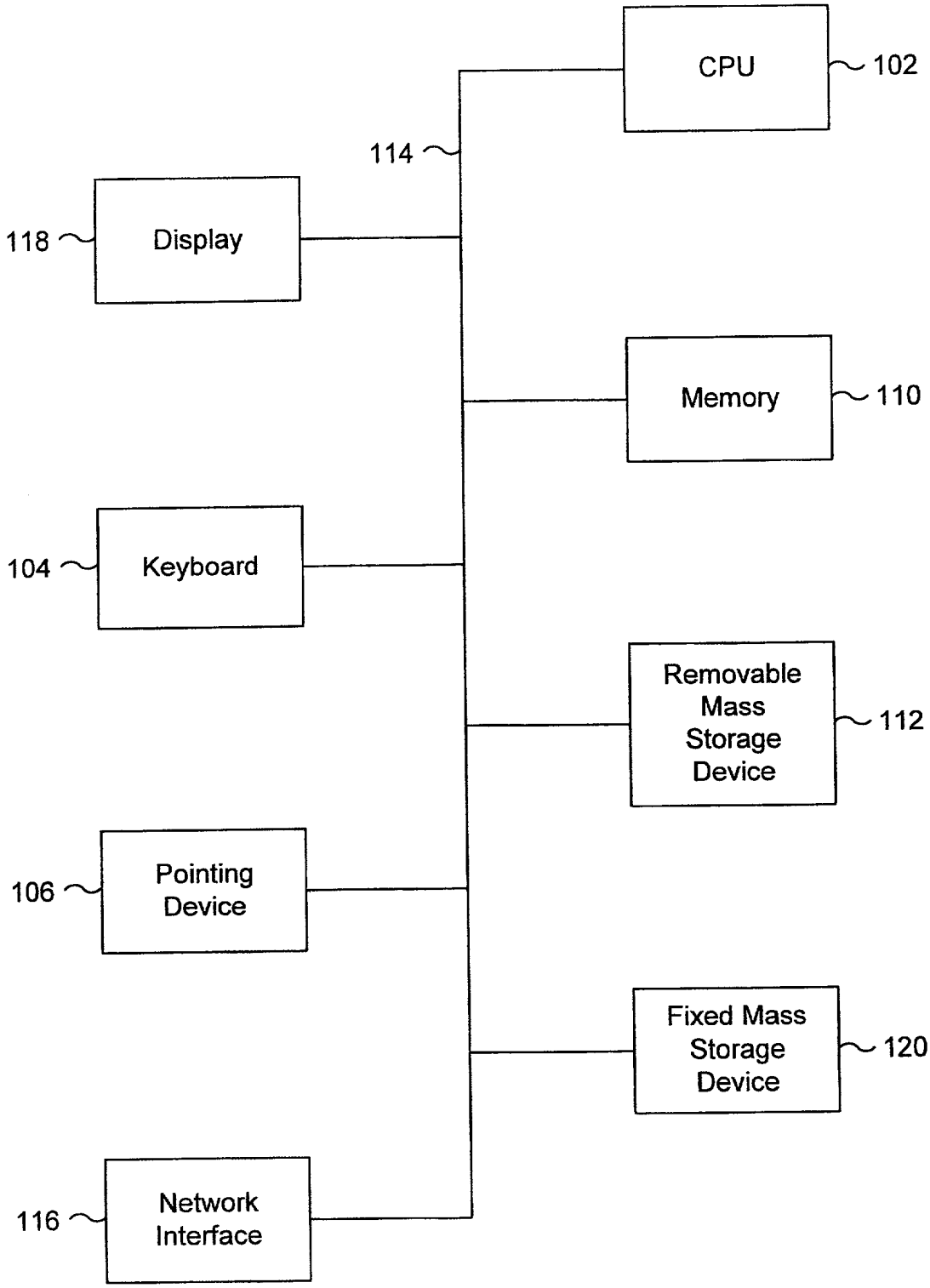
CPU
102
114
Display
118
Memory
110
Keyboard
104
Removable
Mass
Storage
Device
112
Pointing
Device
106
Fixed Mass
Storage
Device
120
Network
Interface
116

Figure 3

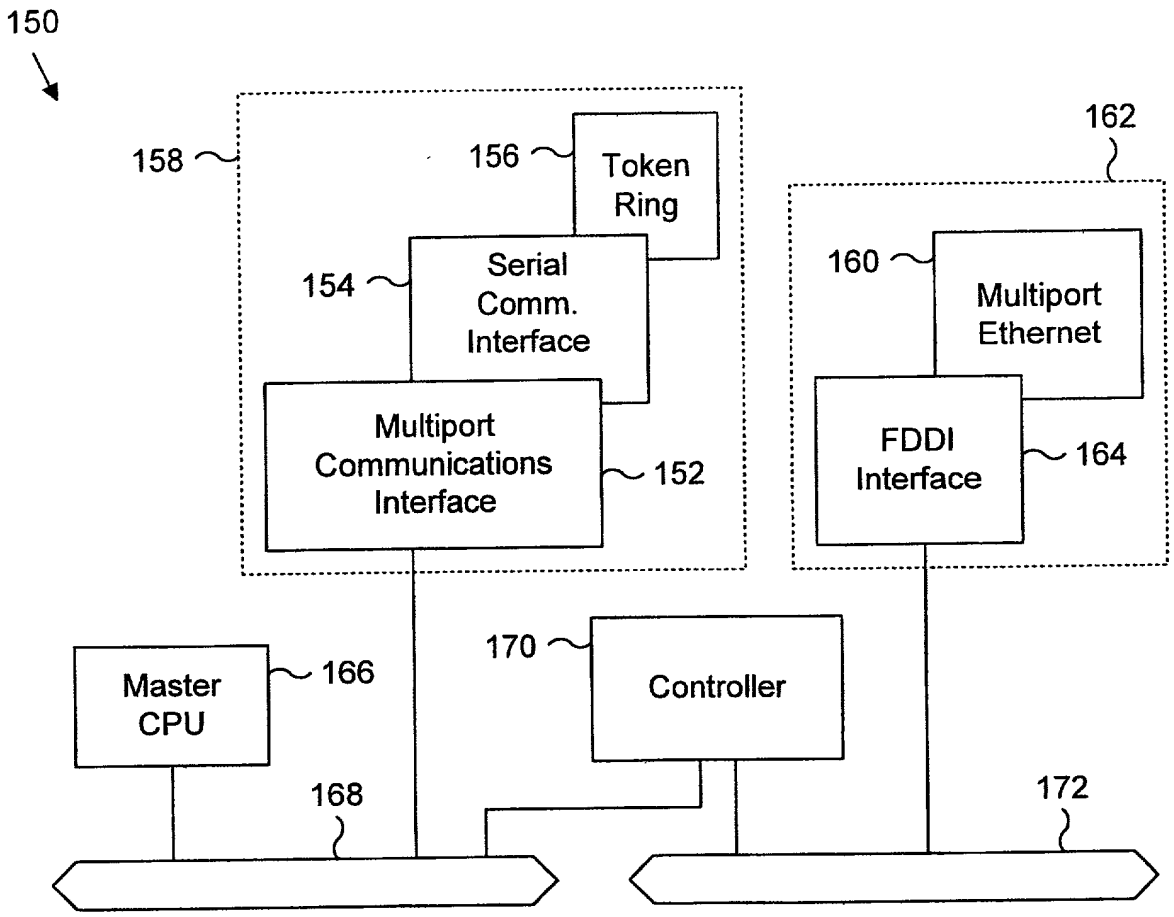
150
158
156
Token Ring
154
Serial Comm. Interface
Multiport Communications Interface
152
162
160
Multiport Ethernet
FDDI Interface
164
Master CPU
166
170
Controller
168
172

Figure 4

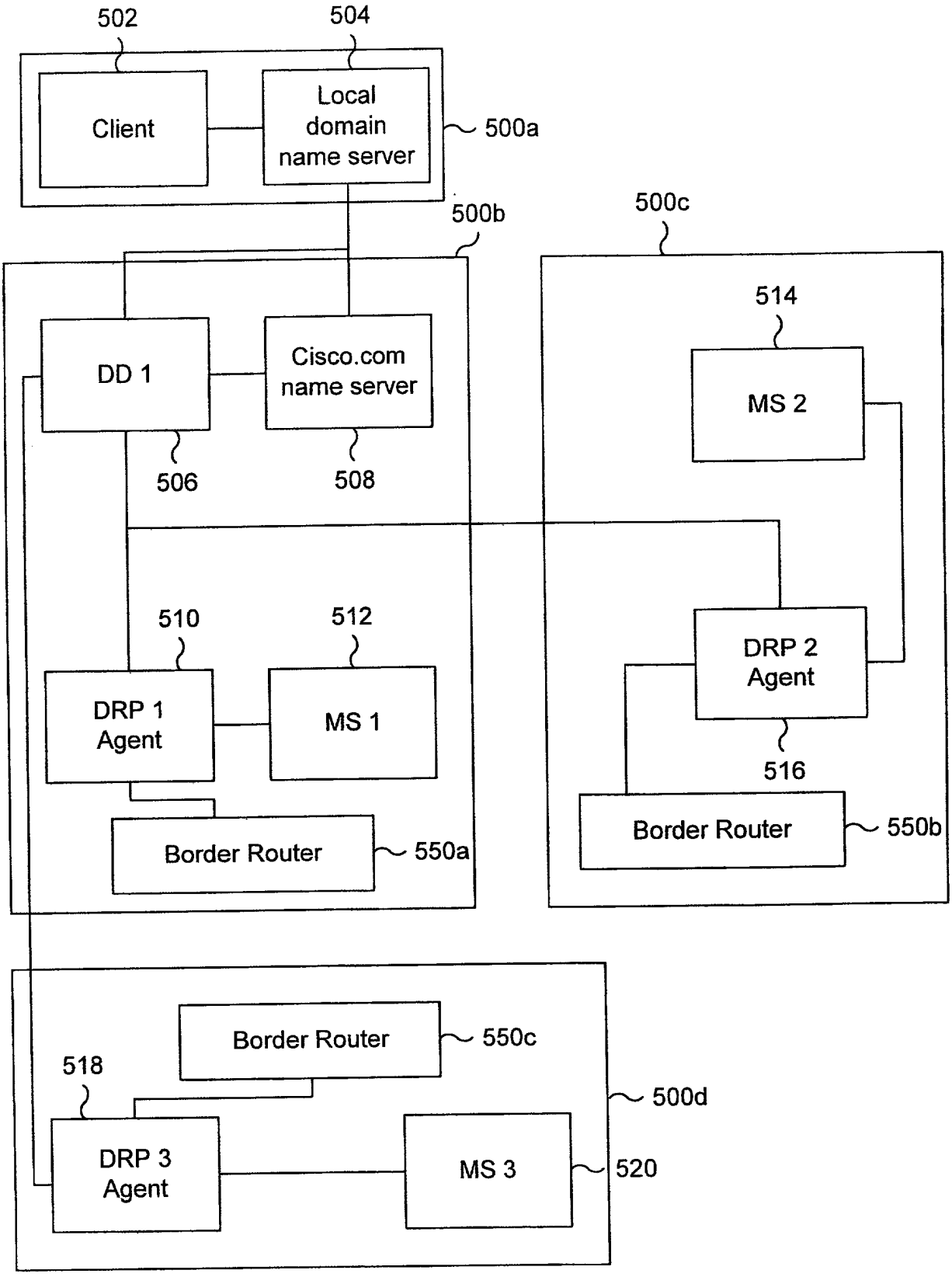
502
504
Client
Local domain name server
500a
500b
500c
514
DD 1
Cisco.com name server
MS 2
506
508
510
512
DRP 1 Agent
MS 1
DRP 2 Agent
516
Border Router
550a
Border Router
550b
Border Router
550c
518
500d
DRP 3 Agent
MS 3
520

Figure 5

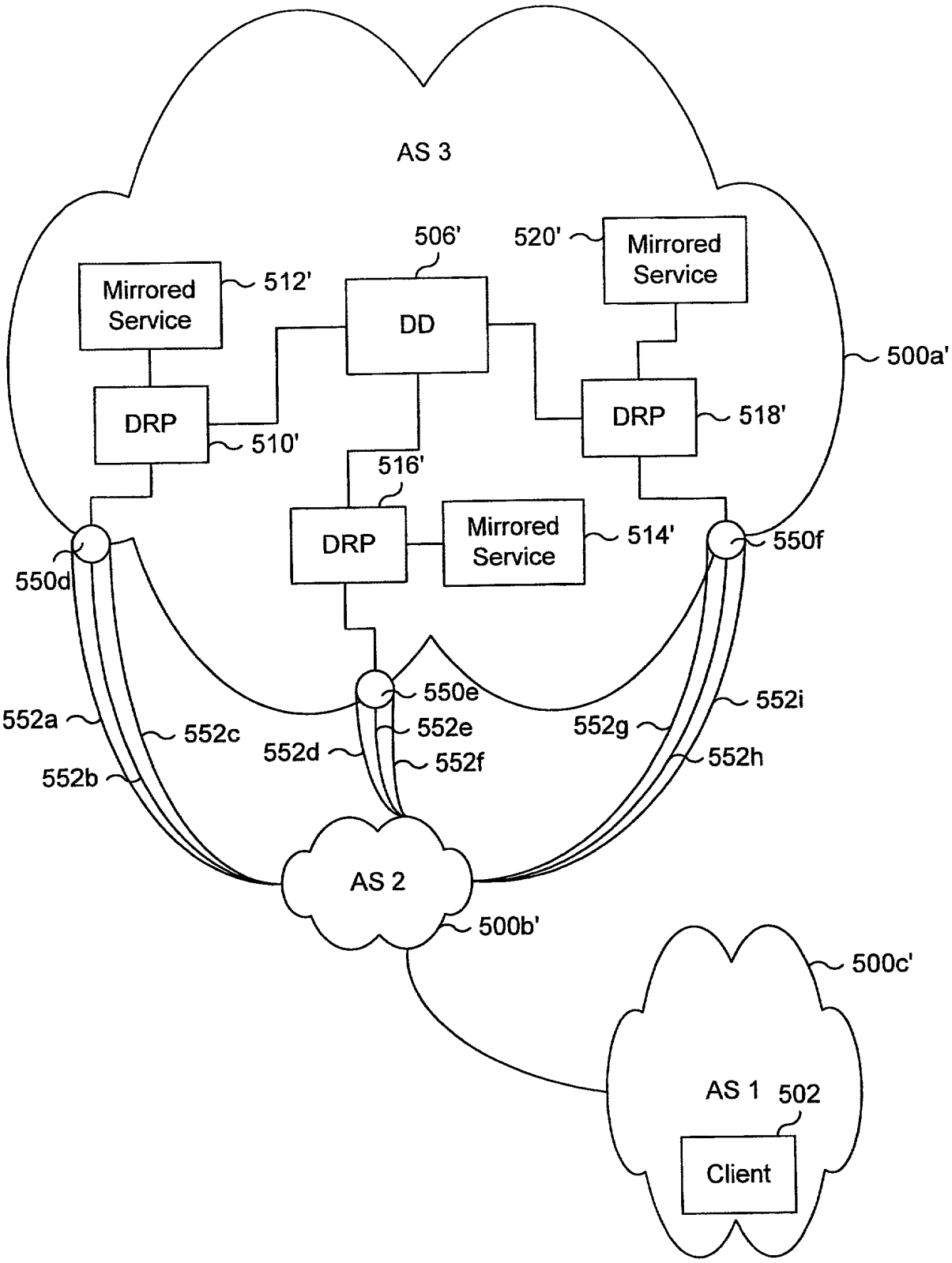
AS 3
506'
520'
Mirrored Service
Mirrored Service
512'
DD
500a'
DRP
510'
DRP
518'
516'
DRP
Mirrored Service
514'
550f
550d
550e
552a
552c
552d
552e
552f
552g
552i
552b
552h
AS 2
500b'
500c'
AS 1
502
Client

Figure 6

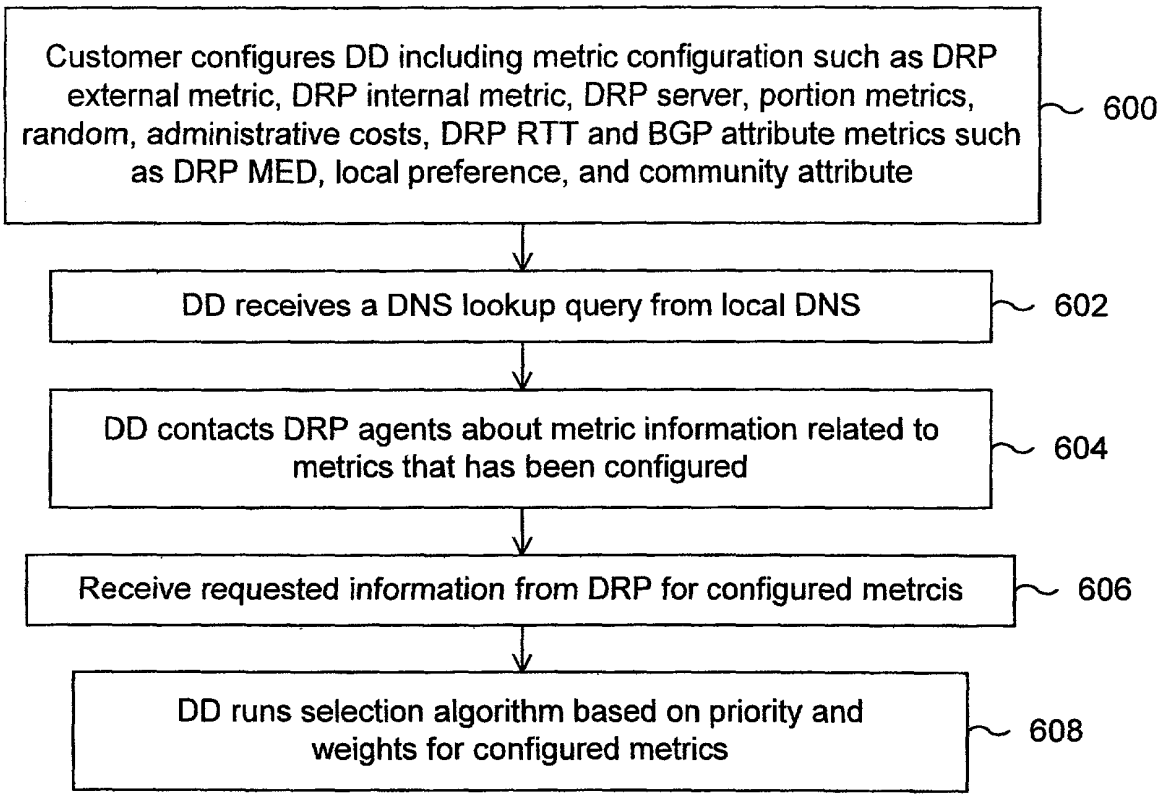
Customer configures DD including metric configuration such as DRP external metric, DRP internal metric, DRP server, portion metrics, random, administrative costs, DRP RTT and BGP attribute metrics such as DRP MED, local preference, and community attribute
600
DD receives a DNS lookup query from local DNS
602
DD contacts DRP agents about metric information related to metrics that has been configured
604
Receive requested information from DRP for configured metrcis
606
DD runs selection algorithm based on priority and weights for configured metrics
608

Figure 7

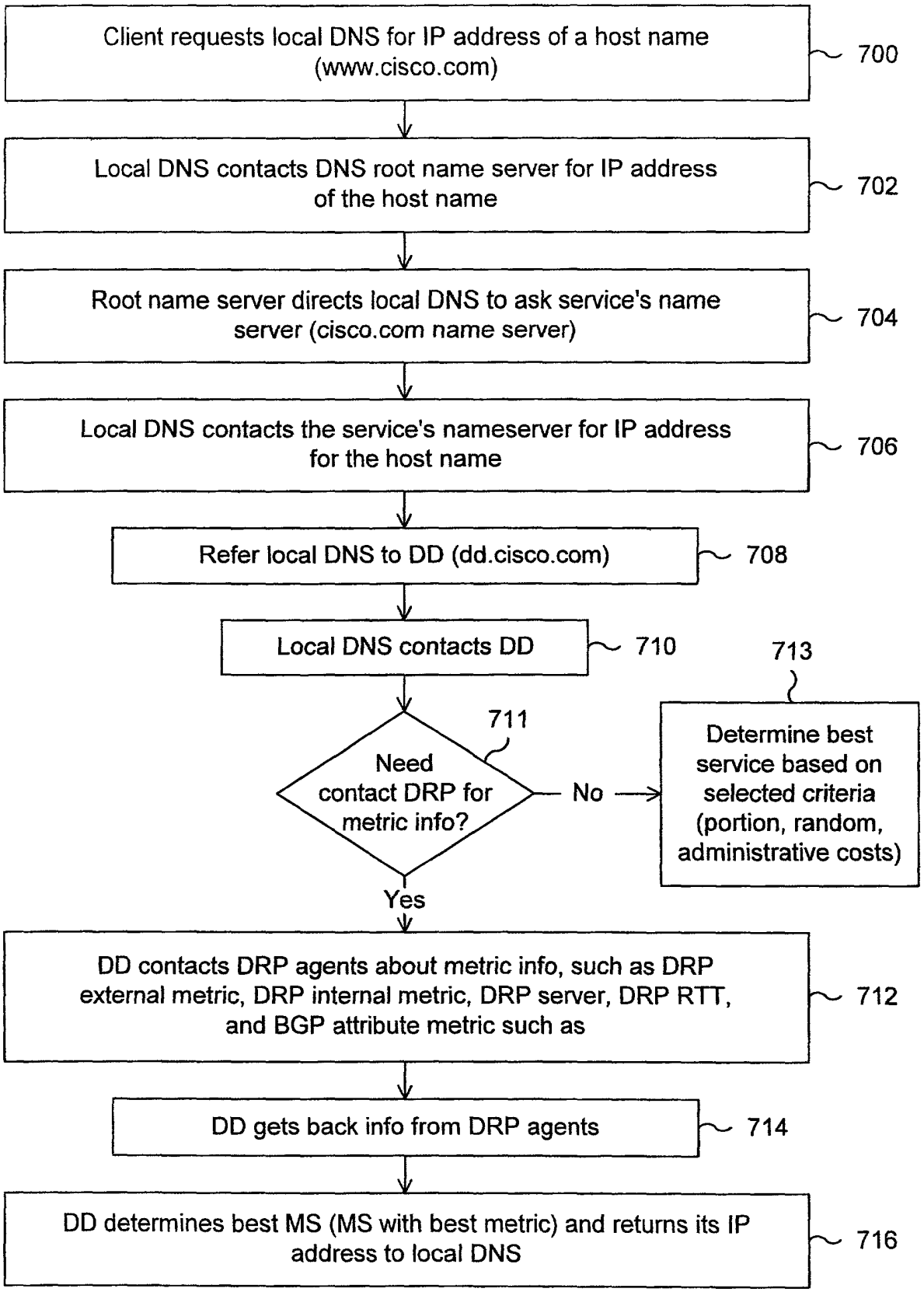
Client requests local DNS for IP address of a host name (www.cisco.com)
700
Local DNS contacts DNS root name server for IP address of the host name
702
Root name server directs local DNS to ask service's name server (cisco.com name server)
704
Local DNS contacts the service's nameserver for IP address for the host name
706
Refer local DNS to DD (dd.cisco.com)
708
Local DNS contacts DD
710
713
711
Need contact DRP for metric info?
No
Determine best service based on selected criteria (portion, random, administrative costs)
Yes
DD contacts DRP agents about metric info, such as DRP external metric, DRP internal metric, DRP server, DRP RTT, and BGP attribute metric such as
712
DD gets back info from DRP agents
714
DD determines best MS (MS with best metric) and returns its IP address to local DNS
716

Figure 8

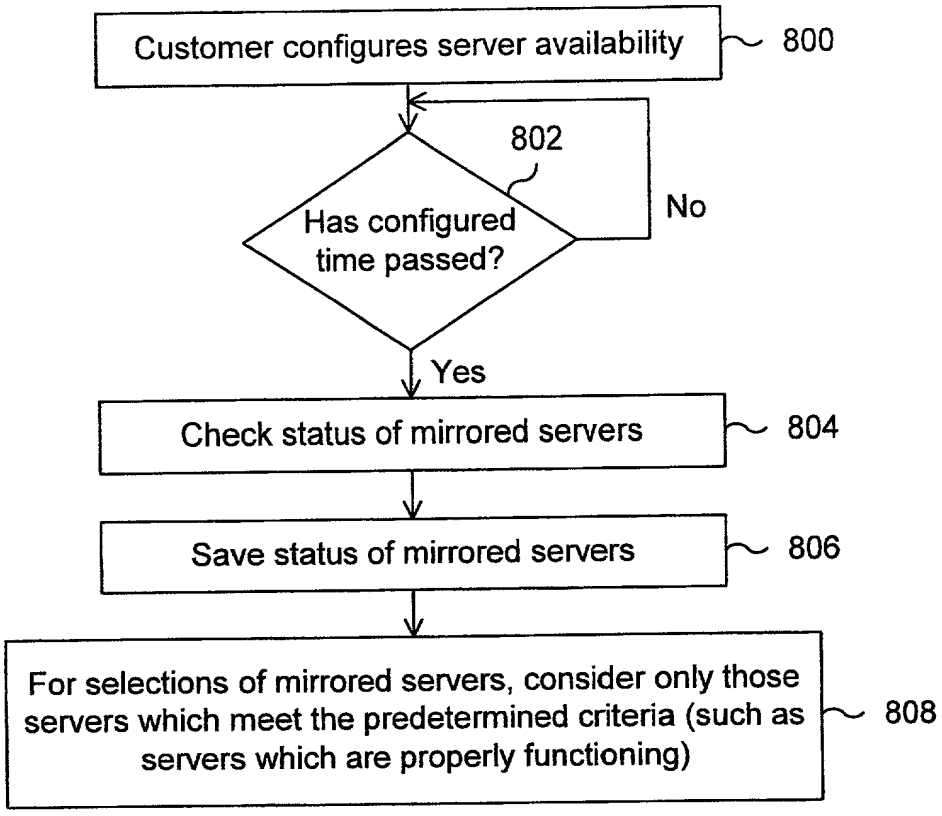
Customer configures server availability
800
802
Has configured time passed?
No
Yes
Check status of mirrored servers
804
Save status of mirrored servers
806
For selections of mirrored servers, consider only those servers which meet the predetermined criteria (such as servers which are properly functioning)
808

Figure 9

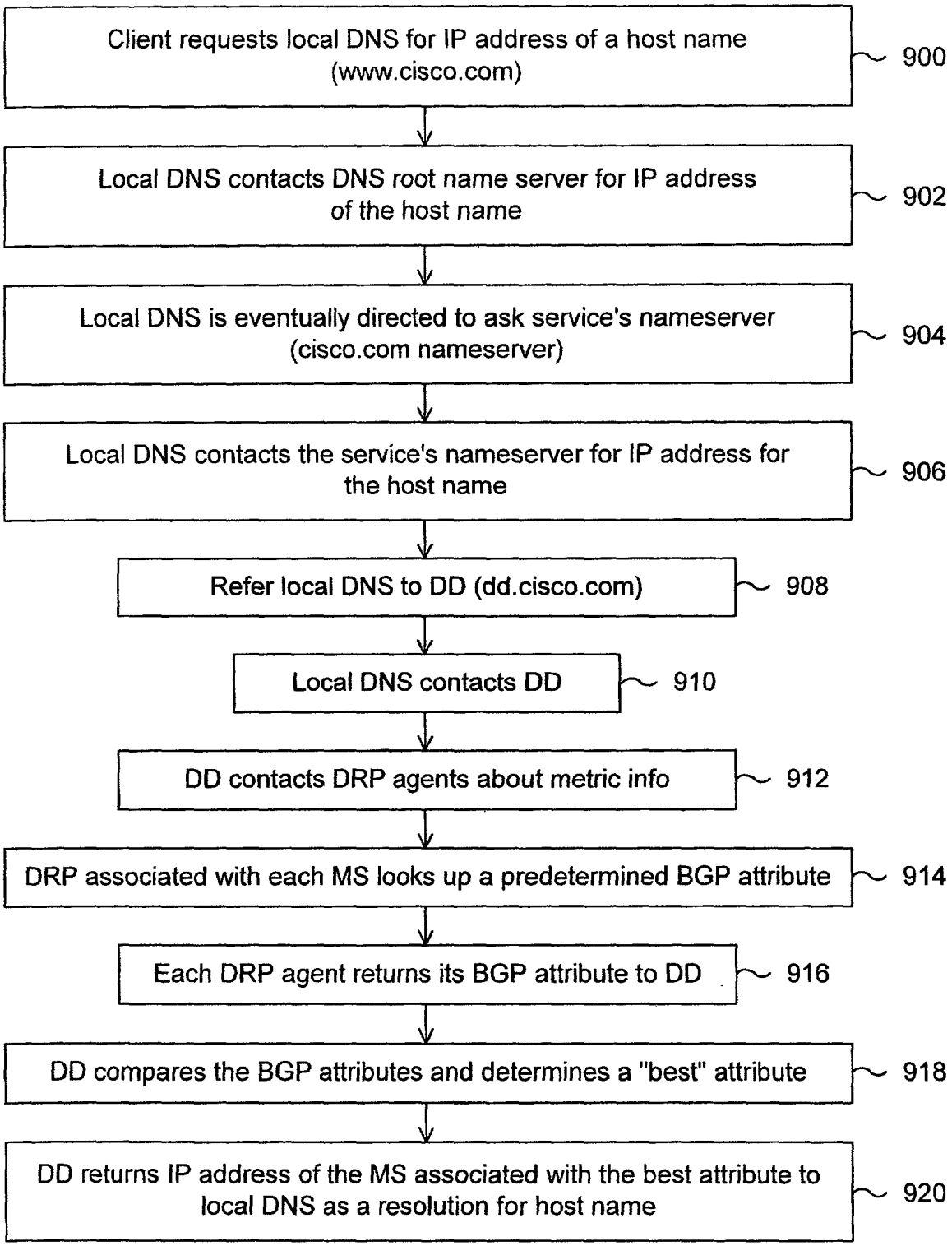
Client requests local DNS for IP address of a host name (www.cisco.com)
900
Local DNS contacts DNS root name server for IP address of the host name
902
Local DNS is eventually directed to ask service's nameserver (cisco.com nameserver)
904
Local DNS contacts the service's nameserver for IP address for the host name
906
Refer local DNS to DD (dd.cisco.com)
908
Local DNS contacts DD
910
DD contacts DRP agents about metric info
912
DRP associated with each MS looks up a predetermined BGP attribute
914
Each DRP agent returns its BGP attribute to DD
916
DD compares the BGP attributes and determines a "best" attribute
918
DD returns IP address of the MS associated with the best attribute to local DNS as a resolution for host name
920

Figure 10

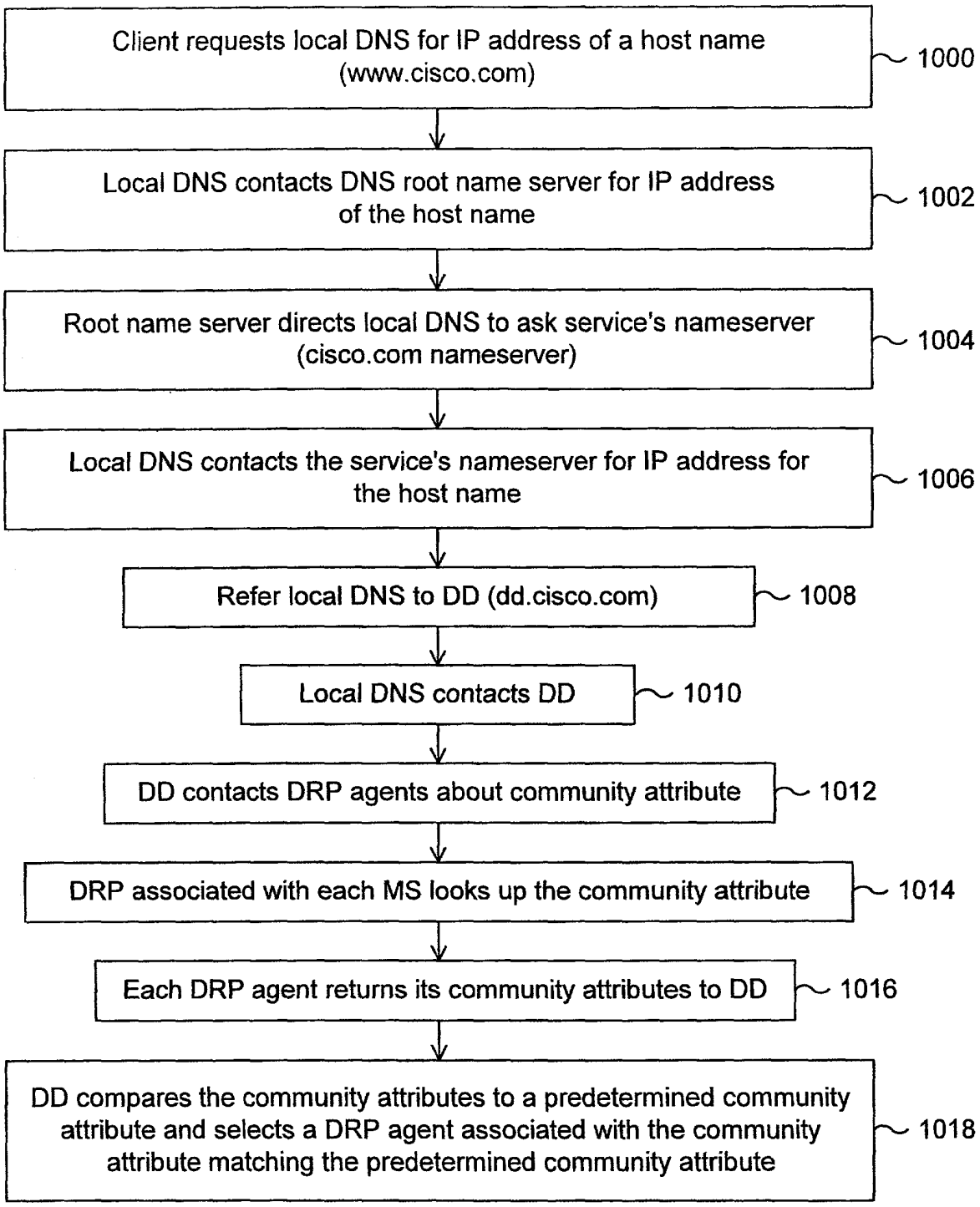
Client requests local DNS for IP address of a host name (www.cisco.com)
1000
Local DNS contacts DNS root name server for IP address of the host name
1002
Root name server directs local DNS to ask service's nameserver (cisco.com nameserver)
1004
Local DNS contacts the service's nameserver for IP address for the host name
1006
Refer local DNS to DD (dd.cisco.com)
1008
Local DNS contacts DD
1010
DD contacts DRP agents about community attribute
1012
DRP associated with each MS looks up the community attribute
1014
Each DRP agent returns its community attributes to DD
1016
DD compares the community attributes to a predetermined community attribute and selects a DRP agent associated with the community attribute matching the predetermined community attribute
1018

Figure 11

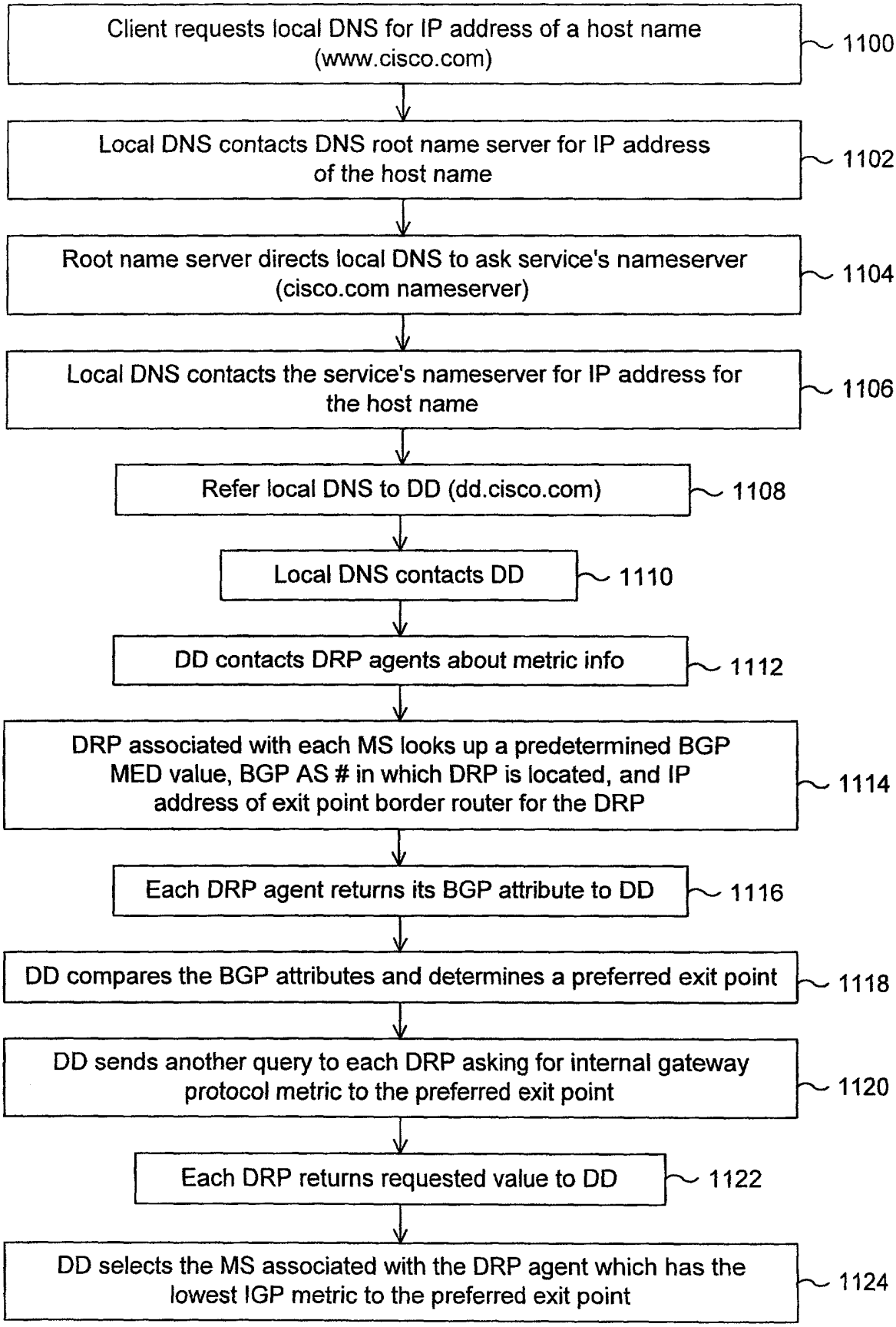
Client requests local DNS for IP address of a host name (www.cisco.com)
1100
Local DNS contacts DNS root name server for IP address of the host name
1102
Root name server directs local DNS to ask service's nameserver (cisco.com nameserver)
1104
Local DNS contacts the service's nameserver for IP address for the host name
1106
Refer local DNS to DD (dd.cisco.com)
1108
Local DNS contacts DD
1110
DD contacts DRP agents about metric info
1112
DRP associated with each MS looks up a predetermined BGP MED value, BGP AS # in which DRP is located, and IP address of exit point border router for the DRP
1114
Each DRP agent returns its BGP attribute to DD
1116
DD compares the BGP attributes and determines a preferred exit point
1118
DD sends another query to each DRP asking for internal gateway protocol metric to the preferred exit point
1120
Each DRP returns requested value to DD
1122
DD selects the MS associated with the DRP agent which has the lowest IGP metric to the preferred exit point
1124

Figure 12

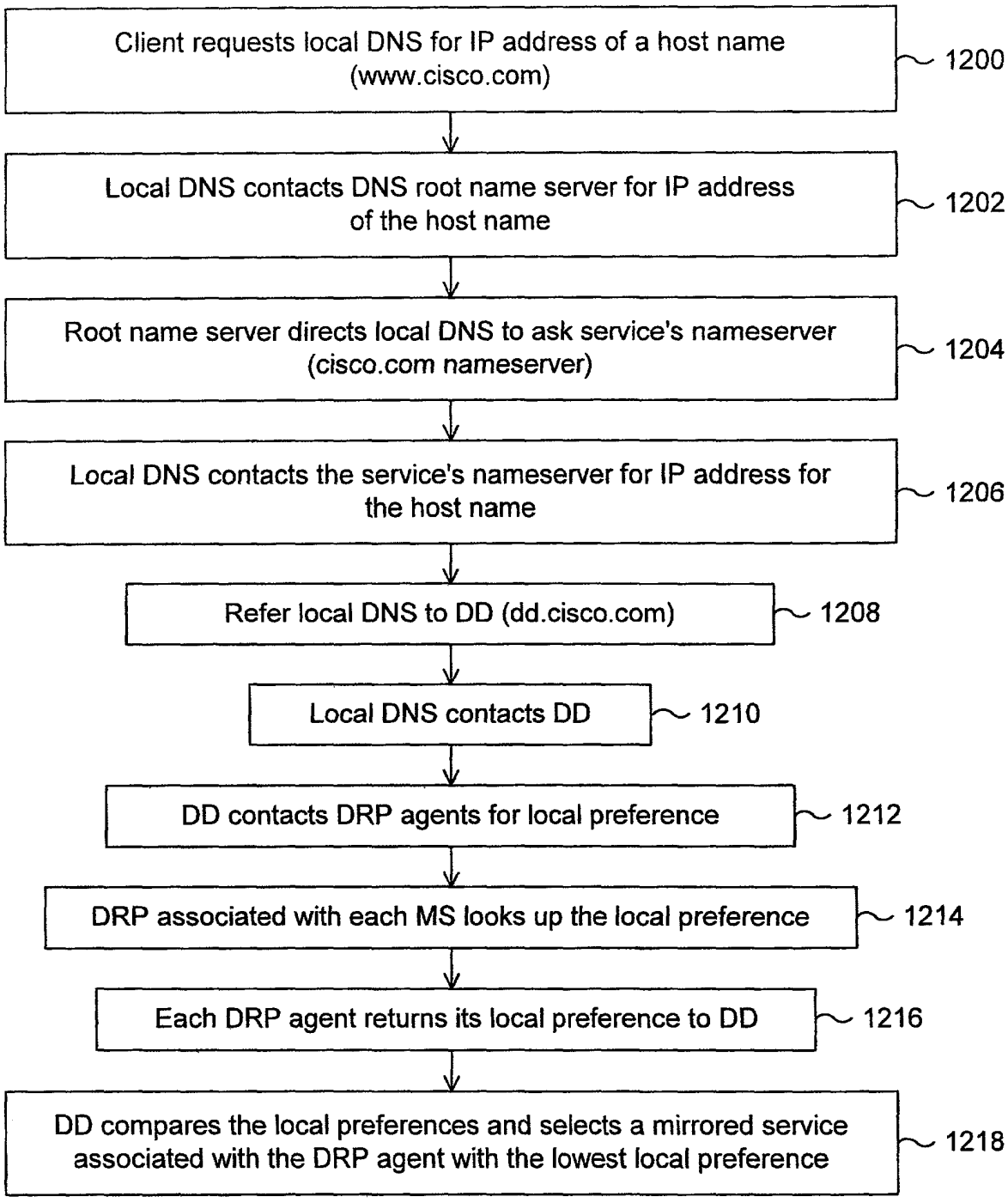
Client requests local DNS for IP address of a host name (www.cisco.com)
1200
Local DNS contacts DNS root name server for IP address of the host name
1202
Root name server directs local DNS to ask service's nameserver (cisco.com nameserver)
1204
Local DNS contacts the service's nameserver for IP address for the host name
1206
Refer local DNS to DD (dd.cisco.com)
1208
Local DNS contacts DD
1210
DD contacts DRP agents for local preference
1212
DRP associated with each MS looks up the local preference
1214
Each DRP agent returns its local preference to DD
1216
DD compares the local preferences and selects a mirrored service associated with the DRP agent with the lowest local preference
1218

Figure 13

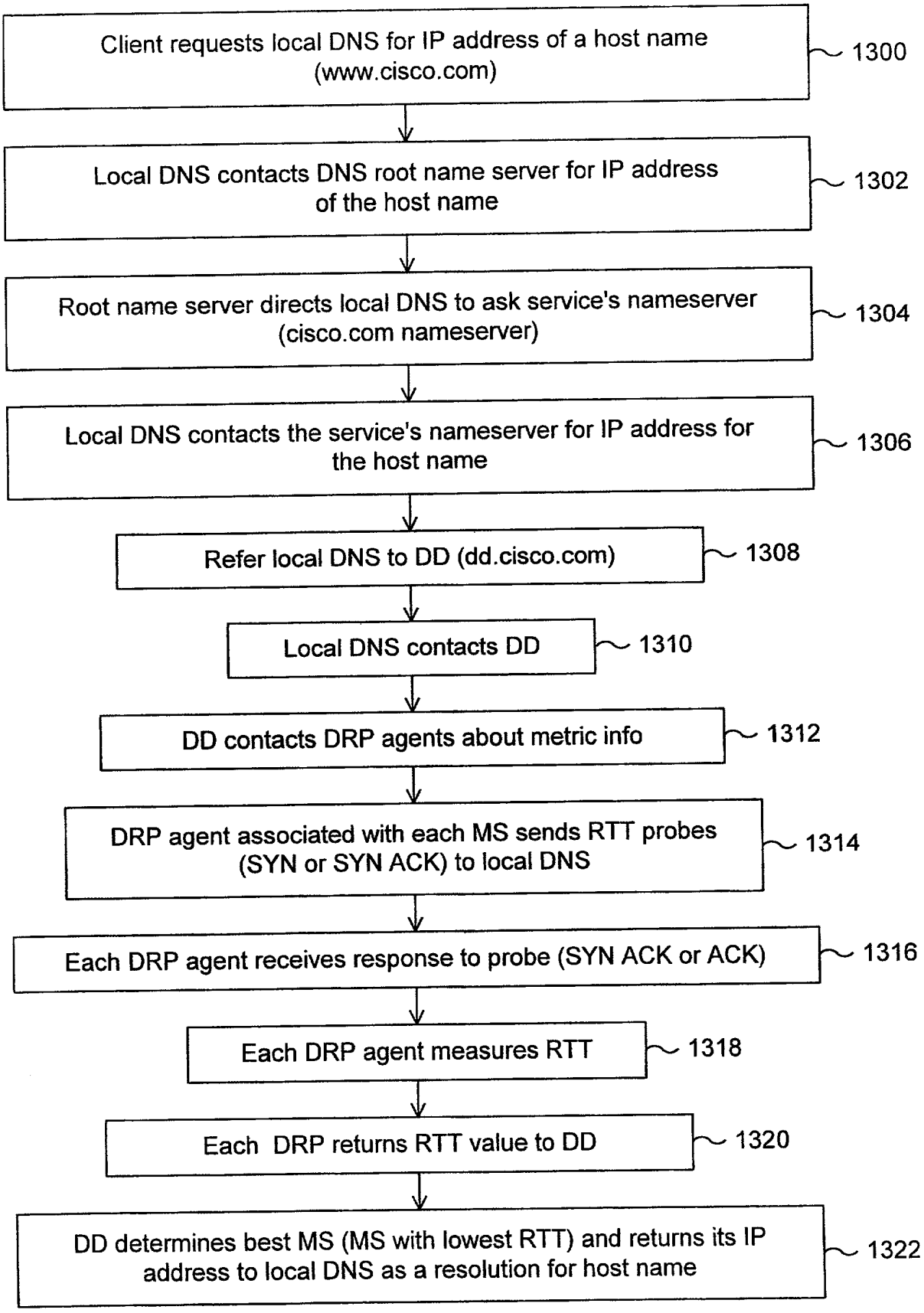
Client requests local DNS for IP address of a host name (www.cisco.com)
1300
Local DNS contacts DNS root name server for IP address of the host name
1302
Root name server directs local DNS to ask service's nameserver (cisco.com nameserver)
1304
Local DNS contacts the service's nameserver for IP address for the host name
1306
Refer local DNS to DD (dd.cisco.com)
1308
Local DNS contacts DD
1310
DD contacts DRP agents about metric info
1312
DRP agent associated with each MS sends RTT probes (SYN or SYN ACK) to local DNS
1314
Each DRP agent receives response to probe (SYN ACK or ACK)
1316
Each DRP agent measures RTT
1318
Each DRP returns RTT value to DD
1320
DD determines best MS (MS with lowest RTT) and returns its IP address to local DNS as a resolution for host name
1322

Figure 14

Server ID	Server Portion
A	7
B	8
C	2
D	2
E	5

Total = 24

Figure 15

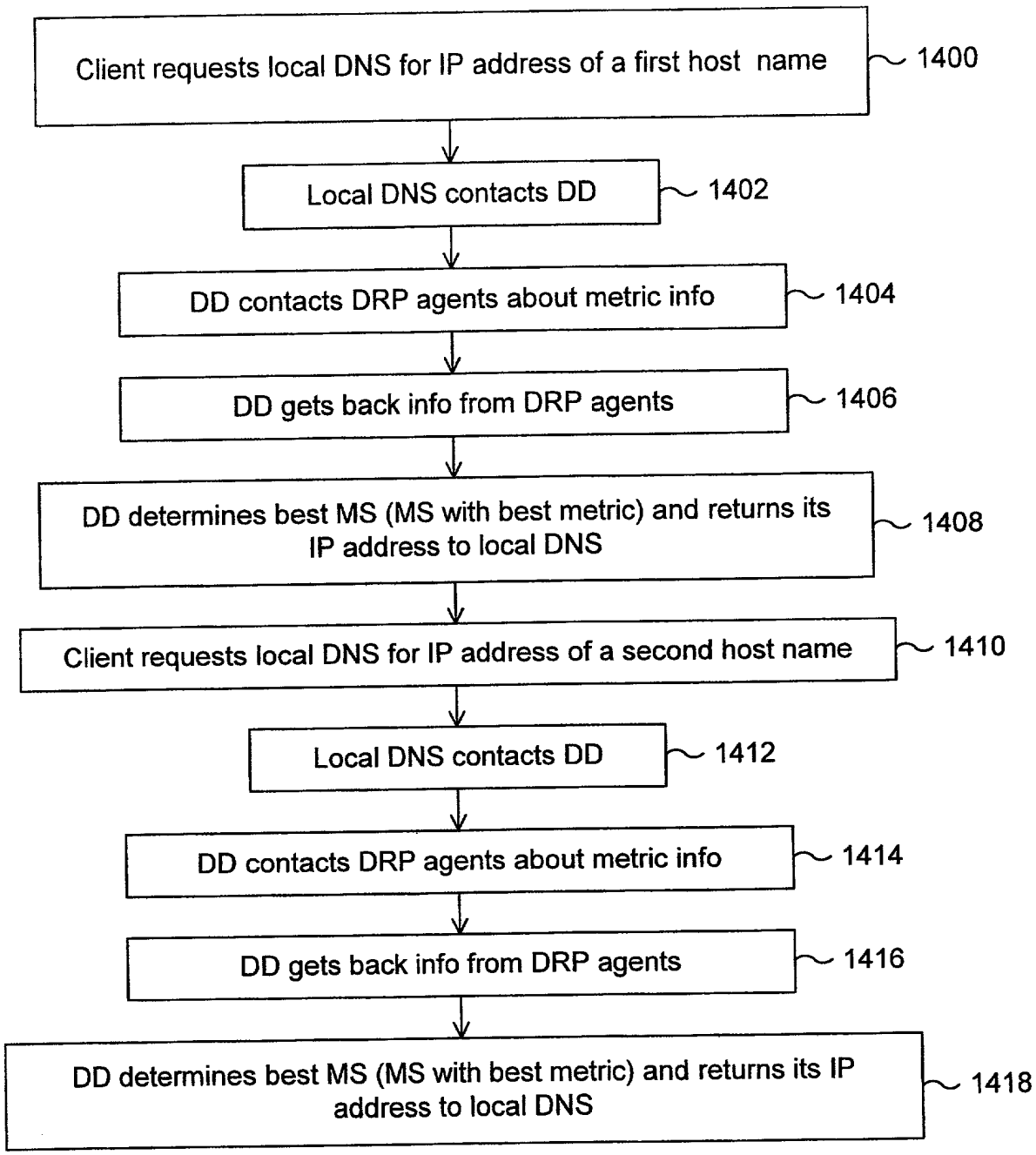
Client requests local DNS for IP address of a first host name
1400
Local DNS contacts DD
1402
DD contacts DRP agents about metric info
1404
DD gets back info from DRP agents
1406
DD determines best MS (MS with best metric) and returns its IP address to local DNS
1408
Client requests local DNS for IP address of a second host name
1410
Local DNS contacts DD
1412
DD contacts DRP agents about metric info
1414
DD gets back info from DRP agents
1416
DD determines best MS (MS with best metric) and returns its IP address to local DNS
1418

Figure 16

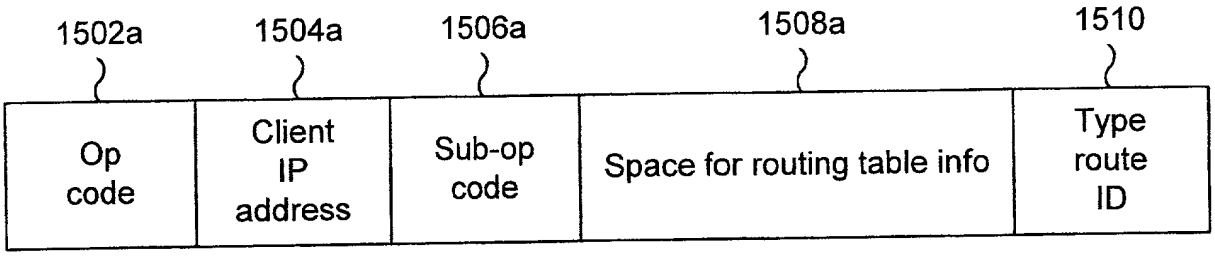

Figure 17A

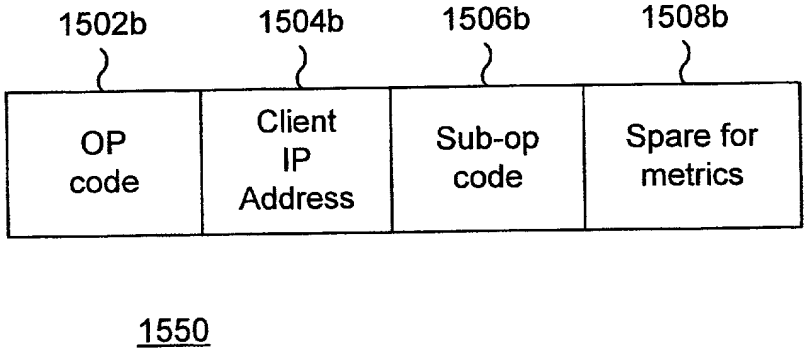

Figure 17B

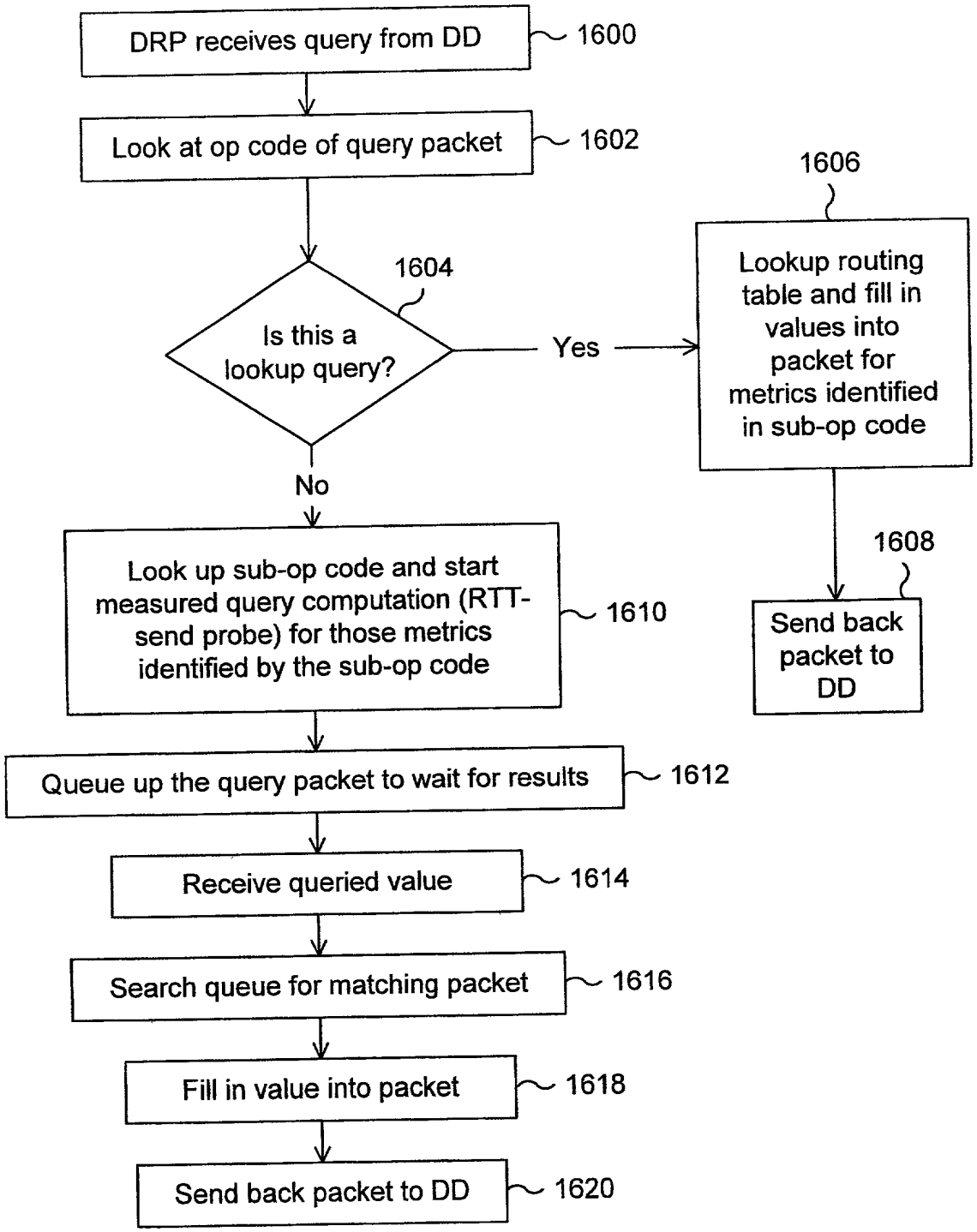
DRP receives query from DD
1600
Look at op code of query packet
1602
1606
Lookup routing table and fill in values into packet for metrics identified in sub-op code
1604
Is this a lookup query?
Yes
No
1608
Send back packet to DD
Look up sub-op code and start measured query computation (RTT-send probe) for those metrics identified by the sub-op code
1610
Queue up the query packet to wait for results
1612
Receive queried value
1614
Search queue for matching packet
1616
Fill in value into packet
1618
Send back packet to DD
1620

Figure 18

	MS 1	MS 2	MS 3	MS 4
Route Type	ISIS	ISIS	OSPF	OSPF
Type #	1	2	3	3
IGP Metric	10	20	30	40

Figure 19

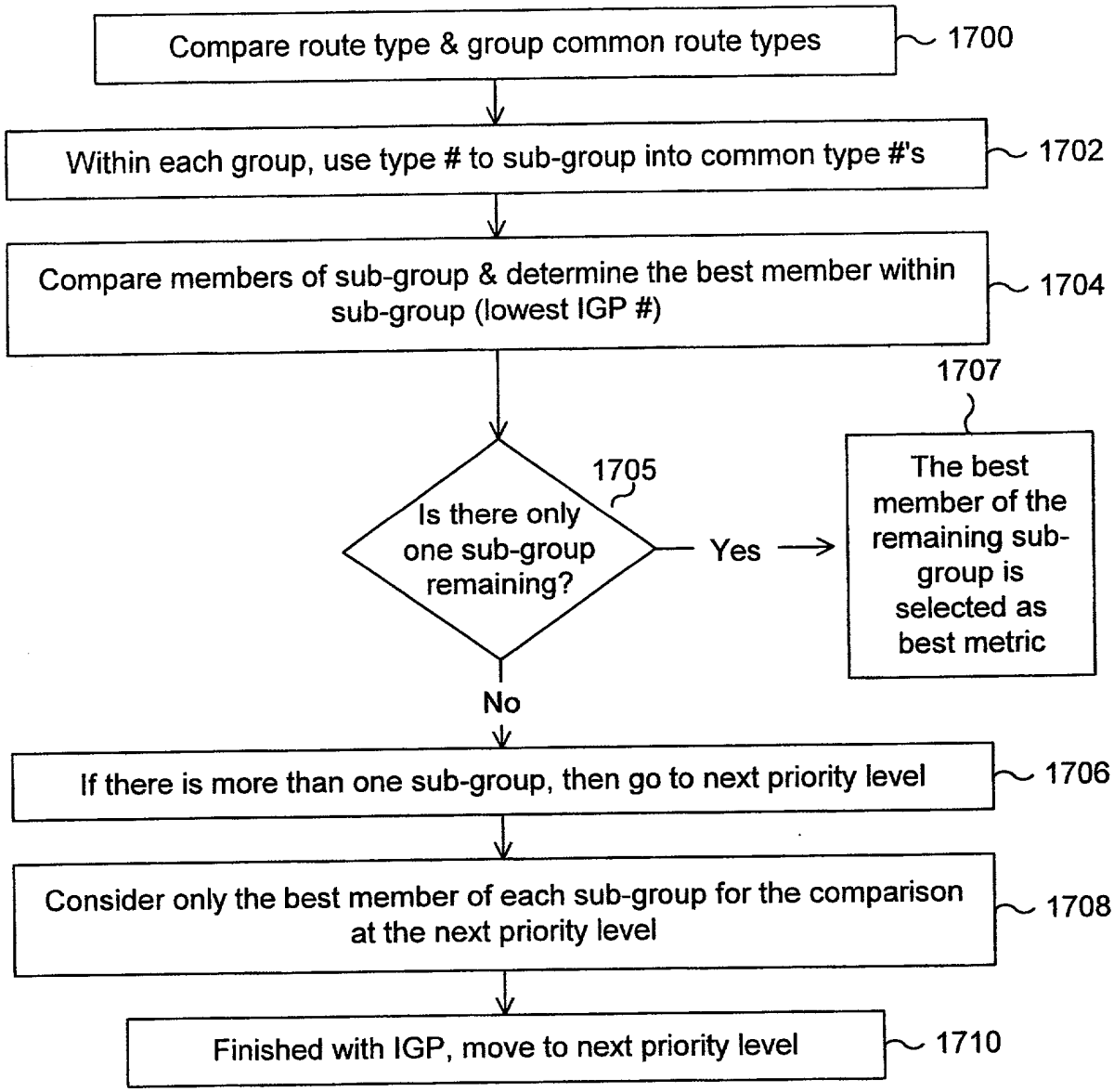
Compare route type & group common route types
1700
Within each group, use type # to sub-group into common type #'s
1702
Compare members of sub-group & determine the best member within sub-group (lowest IGP #)
1704
1707
1705
Is there only one sub-group remaining?
Yes
The best member of the remaining sub-group is selected as best metric
No
If there is more than one sub-group, then go to next priority level
1706
Consider only the best member of each sub-group for the comparison at the next priority level
1708
Finished with IGP, move to next priority level
1710

Figure 20